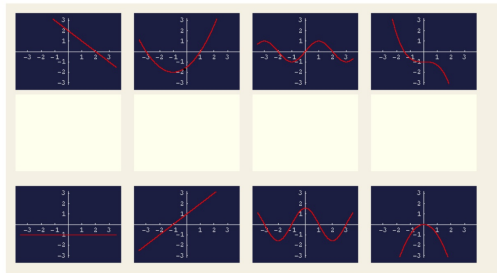


DO NOW

Match the graph of the function in the top row with the graph of its derivative in the bottom row.



Page 1

3.1 Derivatives Introduction - Day 5

Differentiability Implies Continuity:

If f is differentiable at $x=c$,
then f is continuous at $x=c$.

HOWEVER -

Continuity does not imply (guarantee)
differentiability.

* It is possible for a function to be
continuous at $x=c$ and not
differentiable at $x=c$.

Page 2

Nondifferentiability A function is not
differentiable at c if

$\lim_{x \rightarrow c} \frac{f(x) - f(c)}{x - c}$ does not exist.

(left and right sided limits
do not match)

"JUMP" DISCONTINUITY

as $x \rightarrow 0^-$, $f'(x) \rightarrow 0$

as $x \rightarrow 0^+$, $f'(x) \rightarrow \infty$

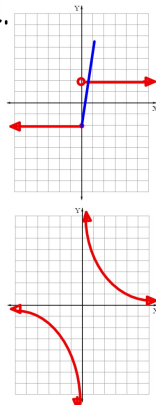
not differentiable at $x=0$

INFINITE DISCONTINUITY

as $x \rightarrow 0^-$, $f'(x) \rightarrow -\infty$

as $x \rightarrow 0^+$, $f'(x) \rightarrow \infty$

not differentiable at $x=0$



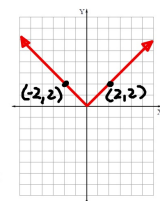
Page 3

CORNER POINTS

as $x \rightarrow 0^-$, $f'(x) \rightarrow -1$

as $x \rightarrow 0^+$, $f'(x) \rightarrow +1$

not differentiable at $x=0$



"estimate"

as $x \rightarrow 1^-$, $f'(x) \rightarrow 2$

as $x \rightarrow 1^+$, $f'(x) \rightarrow \frac{1}{2}$

not differentiable at $x=1$

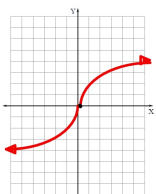


Page 4

VERTICAL TANGENTS

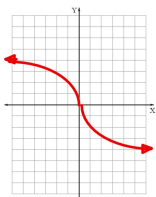
as $x \rightarrow 0$, $f'(x) \rightarrow \infty$

not differentiable at $x=0$



as $x \rightarrow 0$, $f'(x) \rightarrow -\infty$

not differentiable at $x=0$



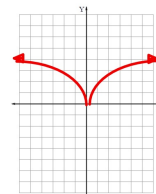
Page 5

VERTICAL CUSPS

as $x \rightarrow 0^-$, $f'(x) \rightarrow -\infty$

as $x \rightarrow 0^+$, $f'(x) \rightarrow \infty$

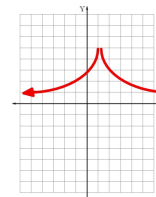
not differentiable at $x=0$



as $x \rightarrow 1^-$, $f'(x) \rightarrow \infty$

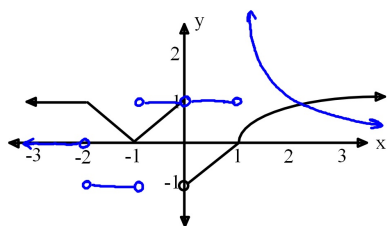
as $x \rightarrow 1^+$, $f'(x) \rightarrow -\infty$

not differentiable at $x=1$



Page 6

Sketch the graph of $f'(x)$, given the graph of $f(x)$ below.



Page 7

HOMEWORK

pg 126; 81 - 86, 91, 93, 95, 100 - 102

Revisit the websites for more practice
with the graphing aspect if necessary.

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